

## **A new species of *Emersonella* (Hymenoptera: Eulophidae), parasitoid on weevil eggs (Coleoptera: Curculionidae), from Costa Rica**

CHRISTER HANSSON\* & KENJI NISHIDA\*\*

\*Department of COB, Zoology, Helgonavägen 3, SE-223 62 Lund, Sweden. [christer.hansson@cob.lu.se](mailto:christer.hansson@cob.lu.se)

\*\*Sistema de Estudios de Posgrado en Biología, Escuela de Biología, Universidad de Costa Rica, 2060 San José, Costa Rica. [knishida@cariari.ucr.ac.cr](mailto:knishida@cariari.ucr.ac.cr)

### **Abstract**

*Emersonella curculiovora* sp.nov. (Hymenoptera: Eulophidae) is described from the Central Valley in Costa Rica. The species is diagnosed and compared to other species in the genus. It was reared from eggs of an undescribed species of *Camptochirus* (Coleoptera: Curculionidae), from stems of *Cinnamomum cinnamomifolium* (Lauraceae). The parasitoid is mainly solitary, but occasionally two individuals emerge from each host.

**Key words:** *Camptochirus*, *Cinnamomum cinnamomifolium*, Curculionidae, *Emersonella*, Eulophidae, Neotropical, taxonomy

### **Introduction**

The genus *Emersonella* is a large genus occurring only in the Americas, with its main distribution in the Neotropical Region. Hansson (2002) treated all known species of *Emersonella*, and included numerous new species with host records. All known host records suggest that species of *Emersonella* are confined to eggs of Chrysomelidae. Below we describe a new species reared from eggs of Curculionidae, an entirely new taxonomic host group, making the description of this species particularly important.

Species of *Emersonella* are diagnosed by having all five flagellomeres distinctly separated in both sexes (Figs 5, 6); antennal scrobes and frontal suture distinct and narrow throughout (Fig. 1); antennal scrobes join below frontal suture (Fig. 1); frontal suture straight or slightly downcurved laterally, and situated high up on frons (Fig. 1); lateral panels of metanotum with a complete longitudinal carina medially, carina divides each panel in two parts (Fig. 3).

The host weevil is a new species of *Camptochaerus* which is currently in the process of being described by Lyal and Nishida (in prep.).

### Collecting locality and methods

The study was conducted on the campus of the University of Costa Rica (9°56'N 84°03'W, elevation 1150 m) in Montes de Oca, San Pedro, San José. According to Holdridge (1967), the habitat on the university campus is considered to be a moist premontane tropical forest. However, today the campus is located in a large urbanized part of San José and the surrounding areas are therefore highly altered, although a few abandoned coffee plantations still remain in the area.

Between the months of October and December, 2002, young growing stems of *Cinnamomum cinnamomifolium* were collected and brought to the entomological laboratory of the university (average room temperature: 23 to 24°C). The female weevil makes a hole and lays her eggs (one egg per hole) in the stem and then fills the hole with a brown cement-like substance (Fig. 7). We call this cement-like structure a “cement-enclosure”. The stems were thoroughly examined for the cement-enclosures of *Camptochaerus*. To observe the condition of the weevil egg, the surface of the cement-enclosure was cut away with a sharp knife. When the egg was parasitized the stem was placed in a transparent plastic bag to rear the parasitoid. The reared adult wasps were preserved in 75% alcohol pending continued processing (see Noyes 1982).

### Distribution of the host and the host plant

The host weevil has been collected in Heredia (Suarez 1992) and San José provinces, in Costa Rica. The host plant, *Cinnamomum cinnamomifolium* (Kunth) Kosterm. (Lauraceae), formerly known as *Phoebe cinnamomifolia*, occurs commonly from elevations around 600 m up to about 1500 m on both the Pacific and the Atlantic slopes in Costa Rica. This plant species ranges from southern Mexico, through Central America, to Bolivia in South America (Burger & van der Werff 1990; Missouri Botanical Garden 2003).

### Acronyms of museums

BMNH, Natural History Museum, London, England; CH, collection of Christer Hansson; INBio, Instituto Nacional de Biodiversidad, Santo Domingo, Costa Rica; MIUCR, Museo de Insectos, Universidad de Costa Rica, San Pedro.

Diagnosis. Notaular depressions large, round and distinct (Fig. 3); female with final gastral tergite about six times as long as width at base (Fig. 4); vertex with a groove from lateral ocellus towards eye, groove does not reach eye but continues along and close to eye towards frontal suture and continues a bit below suture (Figs 1, 2); malar sulcus absent (Fig. 1); thoracic dorsum convex; propodeum with two large anterolateral foveae (Fig. 3). This species is easily separated from all known species of *Emersonella* by the distinct and large notaular depressions.

Description (imagines). Length of body female 1.0 mm (excl. last gastral tergite), male 0.9–1.0 mm.

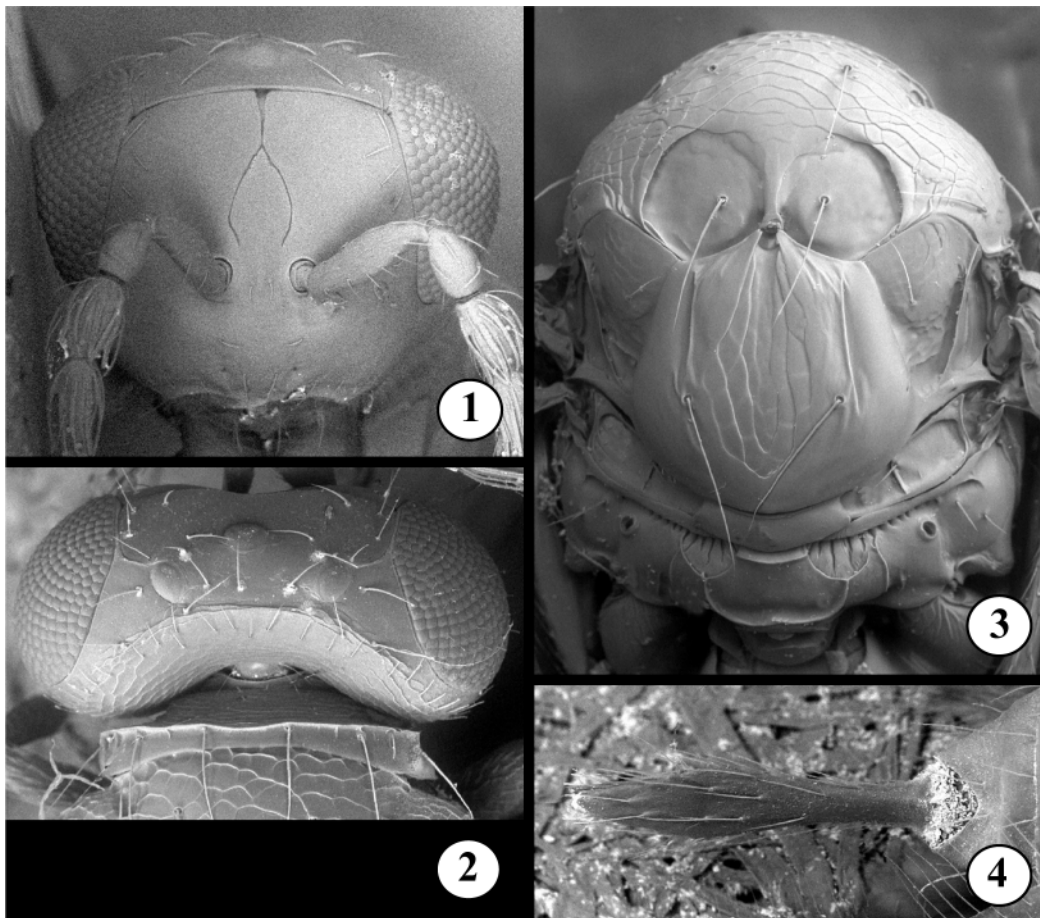
Scape yellowish-white, remainder of antenna dark brown with metallic tinges. Frons metallic bluish-green. Vertex metallic bluish-purple. Mesoscutum golden-purple. Scutellum brownish with golden-purple tinges, i.e. paler than mesoscutum. Propodeum metallic bluish-green to golden-purple. Coxae dark and metallic; femora and tibiae predominantly dark brown with apices yellowish-white; tarsal segments 1–3 white, segment 4 pale brown. Wings hyaline. Petiole dark. Female gaster with 1st tergite metallic bluish-purple, remaining tergites golden-purple; male with anterior of gaster white, posterior metallic bluish-purple.

Antennae as in Figs 5, 6. Frons and vertex smooth and shiny; frontal suture slightly down-curved laterally. Malar sulcus absent. Occipital margin rounded. Eyes with scattered hairs. Ratios of height of head/width of head 0.8; height of eye/malar space/width of mouth opening: female 1.9/1.0/1.5, male 1.9/1.0/1.4; distances between posterior ocelli/between posterior ocellus and eye/between posterior ocelli and occipital margin 4.6/1.7/1.0; width of head/width of thorax across shoulders 1.2.

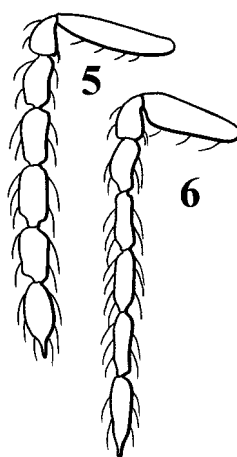
Thoracic dorsum convex. Pronotum well developed, with a strong carina close to posterior margin. Mesoscutum with rather strong reticulation; notaular depressions large, round and smooth. Scutellum convex and shiny with weak and engraved reticulation medially, with a median groove in anterior 1/4. Dorsellum flat and smooth. Fore wing speculum closed below; with 9–10 admarginal setae. Propodeum with a small anteromedian fovea and two large anterolateral foveae, foveae with longitudinal carinae; with curved carinae from upper corners of petiolar foramen; propodeal callus with two setae. Petiolar foramen rounded. Ratios of: length of fore wing/length of marginal vein/height of fore wing 1.8/1.0/1.0; length of postmarginal vein/length of stigmal vein 0.8.

Petiole about as long as wide in both sexes, with rather strong small meshed reticulation and irregular sculpture. Female gaster ovate. Ratio of length of mesosoma/length of gaster: female 1.2–1.4 (excl. elongate last gastral tergite), male 1.2–1.3.

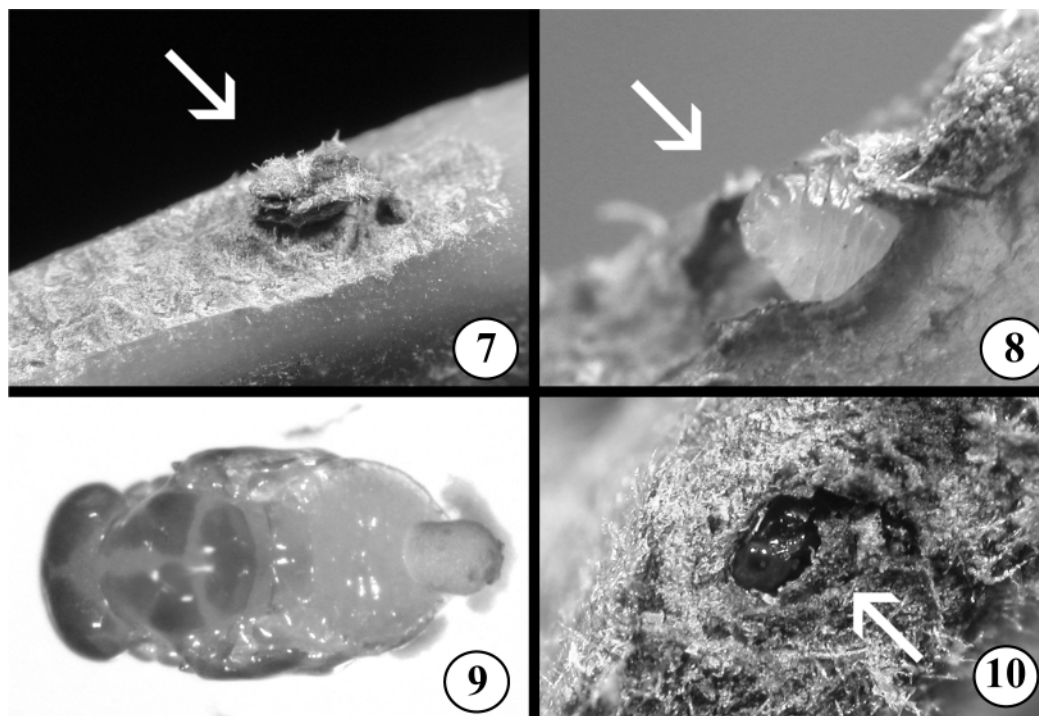
Mature larva (Fig. 8). Subspherical. Translucent to pale brown. Length ca. 0.75 mm. Head width ca. 0.08 mm. Head capsule translucent pale brown. Mandibles brown, crossing over each other at apex when closed.



**FIGURES 1–4.** *Emersonella curculiovora* sp.nov. 1. Head frontal, female. 2. Head and pronotum dorsal, female. 3. Mesosoma dorsal, female. 4. Apical gastral tergite dorsal, female.



**FIGURES 5–6.** *Emersonella curculiovora* sp.nov., antennae lateral. 5. Female. 6. Male.



**FIGURES 7–10.** Juvenile stages of *Emersonella curculiovora* sp. nov. 7. Host egg case (arrow) on stem of *Cinnamomum cinnamomifolium*. 8. Mature larva (arrow) in situ (host's cement-enclosure partially removed). 9. Dorsal view of a female pupa (note meconium around the ovipositor). 10. Mature pupa (arrow) in situ (host's cement-enclosure cement partially removed).

Pupa (Figs 9, 10). Dorsoventrally flattened. Creamy white (brown to dark brown sclerotized parts were seen as it developed). Female, ca. 0.9 mm long, 0.5 mm wide, 0.3 mm thick ( $n = 1$ ); male, ca. 0.7 x 0.5 x 0.3 mm ( $n = 1$ ).

Biology. Parasitoid in eggs of *Camptochirus* sp. (Coleoptera: Curculionidae) in stems of *Cinnamomum cinnamomifolium*. Fifty percent ( $n = 32$ ) of the weevil cement-enclosures collected contained *Emersonella* larvae, pupae, or adults. A mature larva (Fig. 8) and several pupae (Fig. 10) were observed in the cement-enclosures of the hosts eggs (Fig. 7). Some of the cement-enclosures had a small hole, indicating that *Emersonella* adults had emerged. Several cement-enclosures contained dead and dried adults of *Emersonella*. The cause of this mortality is unknown but is possibly due to unsuccessful emergences. We have found that the parasitism typically occurs as one *Emersonella* individual per host egg. In two cases we have observed two individuals, in both cases a male and female, per host egg. The pupal stage lasted approximately 12 days. Information on the duration of the larval stage was not obtained.

Distribution. Costa Rica.

Material examined. Holotype female labelled “Costa Rica: San José, San Pedro, UCR Campus, 1150 m, 13.xi-16.xii.2002, K. Nishida, ex eggs of stem gall inducer *Camptochaerus* sp. (Coleoptera: Curculionidae) on stems of *Cinnamomum cinnamomifolium* (Kunth)” (BMNH). Paratypes: 7 females 3 males with same label data as holotype (BMNH, CH, INBio, MIUCR).

Etymology. From the Latin *curculio*, weevil, and *voro*, eat, i.e. “weevil-eater”, in reference to the preferred host.

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### Resumen

Se describe una nueva especie, *Emersonella curculiovora* Hansson y Nishida (Hymenoptera: Eulophidae) del Valle Central de Costa Rica. Se analiza y compara la especie con otras especies del género. Los especímenes fueron criados de huevos de una especie no descrita de *Camptochaerus* (Coleoptera: Curculionidae), encontrados en ramas de *Cinnamomum cinnamomifolium* (Lauraceae). El parasitoide es principalmente solitario, pero ocasionalmente dos individuos emergieron de un mismo hospedero.

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